Automated Ultrasonic Inspection Course Syllabus

Introduction

More and more inspection problems are solved using automated ultrasonic inspection, which offers better inspection speeds, accuracy and repeatability. Moreover, the generation of scan images of the test specimen provides the inspector with superior flaw detection and interpretation capabilities.

Automated inspection, however, is not a trivial task. Tektrend has developed this course to introduce ultrasonic inspectors to automated UT and to improve their skills and refresh their knowledge.

Description

In this two day and a half course the participant will receive a thorough explanation of various aspects of automated ultrasonic scanning systems. This instructor-led course covers the basics of operating a robotized scanner, the set up of a scan and the analysis of scanned data. The course features a combination of theoretical lessons and numerous hands-on exercises based on real-life automated inspection applications.

Upon completion of this course participants will understand why and when automated UT inspection is required. Participants will also be able to perform UT scanning by setting the ultrasonic and digitizing parameters, configure the scanning procedures, analyze and interpret automated scan results and find anomalies using scan representation image enhancement tools.

TEKTREND TRAINING CENTRE

Agenda

System Hardware
- **Scanners**
- **Amplifiers**
- **Acquisition Server / Motion Server**
- **System Layout**

System Software
- **ARIUS IV**
- **Purpose**
- **Architecture**

Lesson 1: Digital Ultrasonic
- **Opening a Session**
- **Digitalization of Ultrasonic Signal**
  - Waveform Representation
  - Digitalization
  - Differentiate Analog and Digital UT
  - Differentiate UT and Digitizer Cards
- **Inspection Window**
  - Scope Display
  - Peak Information

Lesson 2: Ultrasonic Waveform Set-Up
- **Waveform Optimization**
- **UT Parameters Setting**
  - Gain, Voltage (Energy)
  - Repetition Rate
  - Damping, Filters
  - Pulser Mode and Trigger Mode
- **Digitizing Parameters Setting**
  - Sampling Rate
  - Input
  - Trigger Mode
  - Peak, Coupling
  - Signal, Averaging

Lesson 3: Gating
- **Concept and Objectives**
- **Gate Type**
  - Display
  - Data
  - Sync
- **Gate Parameters Setting**
- **Multi-Gate**
- **Parameters Files**
- **Setting Units**
  - Assigning Units to Points
  - Speed of Sound
  - Digitizer Zero (delay)
  - Set Scanner Units
- **Peak Information using Gates**

Lesson 4: Robot Displacement
- **Scanner System Axis-Coordinate system**
  - Scanner Axis
  - Scanner Coordinate System
- **Robot Control**
  - Displacement Type
  - Specific Point Definition
  - Remote Pad

Hands On 1 – RealTime Measurement

Lesson 5: Scan Set-Up
- **Scanning**
  - Description of Concept
  - Scanning Requirements
  - Scanning and Indexing Axes
  - Increments, Dimensions
- **Scan Configuration**
  - File Set-Up
  - Scan Setting
- **Running a Scan**

Hands On 2 – Scanning

Lesson 6: Automated Scan Results Analysis
- **Data Representation**
  - A-Scan
  - B-Scans
  - C-Scans
- **Analysis Environment**
  - File Management
  - Environment Description
  - View Correspondence
- **Analysis Environment Axes (Coordinate System)**
- **Views**
  - 3D Projection, B-PLots, Zooming...
- **Soft Gating**
  - Principle and Use
  - Examples

Lesson 7: Analysis Tools
- **Spatial Measurements**
  - Cursors, Rulers
  - Regions of Interest
- **Setting Units**
- **Image Enhancement**
  - Look Up Tables
  - Histogram, Equalization
  - Filters

Hands On 3 – Dimension Measurement

Lesson 8: Advanced Topics
- **System Management**
- **Advanced Sound Velocity Setting**
- **Amplitude in dB**
- **Transducer Characterization Tools**
  - Frequency Response
  - Beam Profile Characterization
- **Other Optional Topics**
  - 2.5 D Scan
  - 3 D Scan
  - Using and Adding DLL's
  - Teach and Learn
  - ICEPAK
  - Accessing Acquisition Server

Lesson 9: Generating a Report
- **Report Utilities**
- **Report Types**
- **Reports – Advanced**

Hands On 4 – Various Scans

Quiz

Discussion and Conclusion

TRAINING CENTRE

Schedule

Day 1	*Day 2*	*Day 2*
Introduction - System Hardware & Software	Lesson 5 **Scan Set Up**	Lesson 8 **Advanced Topics**
Lesson 1 **Digital Ultrasonics**		Lesson 9 **Generating a Report**
Lesson 2 **Ultrasonic Waveform Set Up**	Hands On 2 **Scanning**	Hands On 4 **Various Scans**
Lesson 3 **Gating**		
Lunch	**Lunch**	**Quiz – Discussion Conclusion**
Lesson 4 **Robot Displacement**	Lesson 6 **Scan Set Up**	
Hands On 1 **Real Time Measurements**	Lesson 7 **Scan Set Up**	
	Hands On 3 **Dimensions Measurements**	

Instructors

The course will be given at Tektrend by Julie Gauthier and Raymond Bergeron, both of whom have extensive experience in using automated UT for NDT inspection. Ms Gauthier holds a Master's degree in Physics in NDT, and a Level III UT Certificate. Mr. Bergeron is an engineer who as been developing and using automated UT inspection for the last 10 years.

Miscellaneous

Training Location: Tektrend's Montreal facility
Training Date: 11-12-13 September – to be confirmed
Training Info: julie.gauthier@tektrend.com
Tektrend Web Page: http://www.tektrend.com
Prerequisites: UT Level I knowledge
Registration: sophia.puskas@tektrend.com or Tektrend Web page